3.8 – 3.12 Unit Outline

Name _____ **Date** _____**Period** _____

Learning Target	Assessment	M.L. 4	M.L. 3	M.L. 2	M.L. 1
1. I can simplify trig. expressions using the fundamental identities.	3.8 Worksheet 3.8-3.9 Quiz 3.8-3.12 Review				
2. I can prove trig. identities.	3.9 Worksheet 3.8-3.9 Quiz 3.8-3.12 Review				
3. I can use sum and difference identities to simplify trig. expressions.	3.10 & 3.11 Worksheets 3.10-3.11 Quiz 3.8-3.12 Review				
4. I can use multiple angle identities to simplify trig. expressions.	3.12 Worksheet 3.8-3.12 Review				

Mastery Level 4 = I've got this - I can teach this to others. **Mastery Level 3** = I understand - I can do this by myself.
Mastery Level 2 = I mostly get it - I can do this with help. **Mastery Level 1** = I don't understand - I cannot do this yet.

TRIGONOMETRIC IDENTITIES

RECIPROCAL IDENTITIES

$$\cot x = \frac{1}{\tan x} = \frac{\cos x}{\sin x}$$
$$\csc x = \frac{1}{\sin x}$$
$$\sec x = \frac{1}{\cos x}$$

PYTHAGOREAN IDENTITIES

$$\boxed{\sin^2 x + \cos^2 x = 1}$$
$$\sin^2 x = 1 - \cos^2 x$$
$$\cos^2 x = 1 - \sin^2 x$$
$$1 + \tan^2 x = \sec^2 x$$
$$1 + \cot^2 x = \csc^2 x$$

SUM AND DIFFERENCE IDENTITIES

$$\sin(x \pm y) = \sin x \cos y \pm \cos x \sin y$$
$$\cos(x + y) = \cos x \cos y \pm \sin x \sin y$$
$$\tan(x + y) = \frac{\tan x \pm \tan y}{1 \pm \tan x \tan y}$$

DOUBLE-ANGLE IDENTITIES

$$\sin 2x = 2 \sin x \cos x = \frac{2 \tan x}{1 + \tan^2 x}$$
$$\cos 2x = \cos^2 x - \sin^2 x$$
$$= 2\cos^2 x - 1$$
$$= 1 - 2\sin^2 x = \frac{1 - \tan^2 x}{1 + \tan^2 x}$$
$$\tan 2x = \frac{2 \tan x}{1 - \tan^2 x}$$
$$\cot 2x = \frac{\cot^2 x - 1}{2 \cot x}$$

HALF-ANGLE IDENTITIES

$$\sin \frac{x}{2} = \pm \sqrt{\frac{1 - \cos x}{2}}$$
$$\cos \frac{x}{2} = \pm \sqrt{\frac{1 + \cos x}{2}}$$
$$\tan \frac{x}{2} = \pm \sqrt{\frac{1 - \cos x}{1 + \cos x}} = \frac{\sin x}{1 + \cos x} = \frac{1 - \cos x}{\sin x}$$

TRIGONOMETRIC IDENTITIES

Complementary angles

$\sin\theta = \cos(90° - \theta)$ → $\sin 40° = \cos 50°$
$\cos\theta = \sin(90° - \theta)$ → $\cos 15° = \sin 75°$
$\tan\theta = \cot(90° - \theta)$ → $\tan 30° = \cot 60°$

$$\sec\theta = \frac{1}{\cos\theta}$$
$$\operatorname{cosec}\theta = \frac{1}{\sin\theta}$$
$$\cot\theta = \frac{1}{\tan\theta}$$

$$\tan\theta = \frac{\sin\theta}{\cos\theta}$$
$$\cot\theta = \frac{\cos\theta}{\sin\theta}$$

$$\sin^2\theta + \cos^2\theta = 1$$
$$\tan^2\theta + 1 = \sec^2\theta$$
$$1 + \cot^2\theta = \operatorname{cosec}^2\theta$$

$$\sin^2\theta + \cos^2\theta = 1$$

$$\frac{\sin^2\theta}{\cos^2\theta} + \frac{\cos^2\theta}{\cos^2\theta} = \frac{1}{\cos^2\theta} \quad (\div \cos^2\theta)$$
$$\tan^2\theta + 1 = \sec^2\theta$$

$$\frac{\sin^2\theta}{\sin^2\theta} + \frac{\cos^2\theta}{\sin^2\theta} = \frac{1}{\sin^2\theta} \quad (\div \sin^2\theta)$$
$$1 + \cot^2\theta = \operatorname{cosec}^2\theta$$